how severe were some of those which are recorded in history for the reason that statistical data concerning them is meager and imperfect. It is said that in 1889–90 no less than 25 per cent. of the population was attacked in London; 33 in Antwerp; 39 in Massachusetts, and in Paris, 50. In 1832–33 about 40 per cent. of the population of Paris is believed to have been affected. In 1872, three quarters of the population of London and some German cities were supposed to have suffered. The records of earlier visitation are more obscure.

Many observers of pandemics in other years have pointed out that influenza is a more fatal disease than is commonly understood, the fatality being due chiefly to lung and heart complications which do not promptly manifest themselves. Thus, although the number of deaths directly attributed to influenza in England and Wales in 1890 was reported as 4,523 per million, the Registrar General, by analysis of the vital statistics for the period, stated that the number of deaths directly or indirectly attributable was 27,074 per million, or nearly seven times the apparent rate. In London the general death rate was increased by over 20 per cent., in Berlin by more than 60 per cent. and in Paris and Brussels by over 100 per cent. No records now available show that there has ever been so much fatal pneumonia as in the present pandemic

The total number of cases of influenza in the present outbreak, inside and outside of the army camps, will never be accurately known. Although it is beyond doubt that the disease which is prevalent in the camps is the same as that which is widely distributed in civil life, it is not to be assumed that all the cases which occur are officially reported or that every case which is supposed to be influenza is really that disease. At this season of year there are always epidemics of colds and other respiratory infections. The weather this year has been particularly favorable to their occurrence. Under the present conditions of public anxiety, it is but natural that all cases of illness which at all resemble influenza should receive that designation. The net result of all the factors which enter into the matter is confusion. The army records have been systematically tabulated and studied from the first. When the pandemic has subsided the information to be derived from these data should be of much permanent value.

George A. Soper
Major, Sanitary Corps, U. S. A.,
October 26, 1918

BRITISH SCIENCE IN INDUSTRY[1]

After years of what appeared to be fruitless discussion of the relations between industry and science and an annual crop of proposals as to the means whereby these relations might be improved, it would seem that a beginning is being made with the garnering of the harvest. We have not altogether perhaps lost our old habit of carrying out the pioneer work in the scientific field and leaving to others the commercial tillage; but the shock of war has modified the attitude of the devotee of pure science to industrial problems, and the manufacturer has had proof that the head of the research worker is not always in the clouds. Both parties are learning to respect each other, and the result is proving a national benefit. Some of the directions in which the gain has been made are revealed in the exhibition organized by the British Science Guild which is now being held at King's College.

INITIAL DIFFICULTIES

It need hardly be stated that the difficulties which stood in the way of the organizers were by no means insignificant. Not only had the sanction of the Ministry of Munitions and the Board of Trade to be obtained, but as the usual charge for space has not been made to exhibitors it has been necessary to meet the cost mainly by voluntary contributions and the fact that the exhibition is in no sense a trade fair where orders may be obtained has limited the display to those who were actuated by a sense of public spirit rather than any hope of pecuniary gain. The scope of the exhibition, which it was desired to make representative of industrial development since the war be-

[1] From the London *Times*.

gan, has also been dwarfed by the circumstance that so large a percentage of our manufacturing activities has been concerned with war work which it would not be expedient to display to public view. There has been a restriction of the exhibits from other causes, of which the pressure on manufacturers for delivery to the fighting services has been the most important. It is a tribute to those responsible for what has been done that in the face of these restrictive influences they have found it possible to secure the cooperation of manufacturers and scientific workers concerned with so many different branches of industry as to make an effective display of articles now produced in home workshops and laboratories which before the war were obtained chiefly from enemy countries. The chemical, electrical and mechanical engineering industries, iron and steel and non-ferrous metals trades, scientific instrument manufacture, the textile glass industries, and aviation and road transport, as well as food production and preservation, and surgery and bacteriology, have all been laid under tribute.

The first impression the visitor gains is perhaps one in which confusion occupies the chief place. For the moment it would almost seem as if a collector had been allowed to run riot through a host of products, the uses of which are often as asunder as the poles. This impression passes, and the exhibition is seen in its right perspective—not as an ordered sequence of manufacturing processes, but as illustrating the latent capacities of some of our scientific industries, the proper development of which has in the past been throttled partly by the stress of subsidized competition, partly by indifference and lack of application of science to the solution of industrial problems. The numerous sections into which the exhibition is divided are so many milestones on the roads of progress that lead in various directions towards the goal of increased national efficiency.

METALLURGY

The section which is devoted to ferrous metallurgy illustrates the character of the task which has been undertaken during the war. It is now a familiar story how the cutting off of supplies from enemy sources of certain materials essential to the steel trade embarrassed this great industry. The supply of refractory materials not only for the constantly expanding steel trade, but for other key industries had somehow to be maintained Accounts have been given in the *Engineering Supplement* of the fine work done in exploiting our own sources of supply of coke-oven and furnace bricks for various requirements, and the exhibits in this class indicate the success which has been won in the organization of a branch of British trade which has hitherto lacked the stimulus of national effort. It is also the case that the increased applications of the electric furnace in steel manufacture make it more than ever necessary to invoke the aid of exact scientific investigation in the evolution of refractories to withstand the higher temperatures which are coming into use.

What has happened in connection with refractory materials has been repeated in the case of tungsten, an essential constituent of many special steels. Engineers are aware with what energy, on the initiative of Sheffield manufacturers, this subject was attacked and British firms put in a position to produce a range of compounds and metallurgical products for which they previously relied on Germany, notwithstanding the fact that there are ample supplies of the necessary raw materials within the confines of the Empire. Reference is made above to the developments in electric furnace practise, and the section of the exhibition devoted to ferrous metallurgy contains various examples of recent advances. A somewhat striking exhibit illustrates new methods of producing sound steel.

LIGHT ALLOYS

The outstanding advance in non-ferrous metallurgy to which witness is borne at King's College has been in the production of light alloys, the principal application of which has been in the construction of aircraft. This has called for an increased output, not

merely of aluminium, the basis of many light alloys, but also of magnesium, which is now being manufactured on a considerable scale in Great Britain. The production of electrolytic zinc, an increase in the output of copper alloys, the introduction of metals in the powdered form, a considerable extension of die-casting methods, and a general marked improvement in technical practise are other directions in which this little exhibition gives ground for satisfaction in the character of our industrial awakening.

AIRCRAFT AND ROAD MOTORS

One section of the exhibition shows what has been done by the alliance of science and industry to secure that supremacy in the air which is essential to success in modern warfare. The principles which govern design, materials of construction, trend of development in aircraft engines, the use of parachutes to enable airmen to make a safe descent from a damaged machine, the utilization of women workers in aircraft factories—all these things are either illustrated or suggested.

Another group of exhibits illustrates what has been done by the Gas Traction Committee to promote the employment of gas in substitution for petroleum products as a source of power for motor vehicles, and a completely fitted road transport vehicle shows the high pressure equipment which has been approved by the committee for the purpose of an experiment on a commercial scale with 20 motor-omnibuses in London service.

ELECTRICAL APPARATUS

In the electrical section the display is a little disappointing, but the progress in this and other departments of manufacture which have called for the assistance of research workers is indicated, where the exhibits fail to show it, by the excellent series of special articles which form the first section of the official catalogue. Two outstanding developments are, however, the subject of exhibits in the electrical group. One of them shows what has been done to establish a British magneto industry, with the result that during the past four years 300,000 magnetos have been manufactured for war service alone. The measure of this achievement is expanded by the claim which can be justly made that the British magneto is as good as that for which German manufacturer previously held a monopoly. The other exhibit illustrates the progress of electric welding.

The display of scientific instruments is also somewhat meagre, but it has been difficult for maunfacturers to withhold deliveries which were in urgent demand, and the exhibition has been robbed to serve the needs of the country. Much progress has, however, been made in original design, and the output during the war to meet the requirements of the Admiralty, the Ministry of Munitions, and the Air Board has been remarkable. The exhibits sent by the National Physical Laboratory indicate some of the lines of advance, a particular example being the mirror extensometer, a type which was formerly made in Germany. The exhibit from the Teddington establishments shows the character of the experimental work which is now being carried on in the gauge rectifying shop with the object of speeding up the manufacturing process and of obtaining an increased degree of accuracy.

CHEMICAL INDUSTRY

If the special work which has been undertaken on behalf of the engineering trades has been selected for attention here, it is not because equally good results have not been obtained in other industries, but because the situation in engineering was essentially typical of that which existed at the outbreak of war. Nothing which has been accomplished during the past four years is of greater importance than the work in connection with chemical products and processes. The grave deficiencies in the supply of the materials for the production of explosives, dyes and drugs, and the lack of trained chemists to supervise manufacturing processes, have been largely overcome, while experimental work in connection with the supply of intermediate prod-

ucts for the production of dyes—hitherto a great German monopoly—has met with very gratifying success. Quite apart from what has been done by the powerful interests represented by British Dyes (Limited) and its allies, specimens are shown by the Chemical Research Laboratory of the University of St. Andrews of twenty-five fine chemicals previously obtained from enemy sources, most of which are now prepared on the manufacturing scale by processes developed in the laboratory during the past three years and a half.

TEXTILES AND GLASS

Mention must also be made of the extraordinary development of the textile industries. As the exhibits sent by the Bradford Technical College and the Nottingham Chamber of Commerce demonstrate, a considerable advance has been made in the production of worsted goods and of cotton embroideries which were previously almost exclusively imported from Germany. It is recognized that the production of knitting needles is one of the key industries necessary to make Great Britain self-supporting, and a great effort has been made to increase the British output of latch needles, in which before the war Germany held 90 per cent. of the world's trade. Nor is it inappropriate, in view of the use of King's College for the exhibition, to refer to the work which has been done by Sir Herbert Jackson, the professor of chemistry in the college, to provide the chemical and optical glass urgently needed when supplies from Germany and Austria were cut off. The pure potash required for certain glasses is now obtained by a new electrolytic process, and the net result of this and much other work has been the reawakening of the glass industry and the attainment of a position which it is believed is strong enough to enable our manufacturers to meet all assaults upon them.

DOCTOR ALEŠ HRDLIČKA AND THE VERO MAN

IN Bulletin No. 66 of the Bureau of American Ethnology there has recently appeared Dr. Aleš Hrdlička's long-awaited report on the human remains found at Vero, Florida. The delay in printing this document has resulted in giving to it some of the flavor of ancient history. In compensation, however, there are introduced certain original ideas in dynamic geology, some of which will be considered below. Unfortunately there is no adequate treatment of that 160-foot geological section which, we were assured,[1] afforded a view at once comprehensive and enlightening.

The writer does not intend to debate the question whether the geologists and the paleontologists ought to have anything to say in such an important matter as that presented at Vero. It is preferred to introduce two expressions of opinion that ought to have a degree of weight. It happens that both of these were called forth by discoveries made some years ago at Trenton, N. J. Professor W. H. Holmes[2] wrote:

> Little by little the advocates of a paleolithic culture in America have been forced to give up the idea that there is any other reliable test of the age of a culture than that furnished by geology.

Dr. Aleš Hrdlička[3] was engaged in studying a fragment of a human femur and a piece of parietal. Not having gained any results from the comparison with corresponding bones from Florida and Mexico, having regard especially to their chalkiness and their tints of yellow, he delivered the following opinion:

> The determination of the age of the two bones, however, must be based principally on their location with regard to geological formation.

It is evident that Dr. Hrdlička has changed his opinion since that sentence was penned. Perhaps the geological test has not always resulted to his liking, and he has resolved to base his judgments hereafter on the state of development of the skeleton, as determined by European standards. Now he tells us[4] that the age of the strata and the determination and age of the animal remains in them are matters quite irrelevant to the discussion of

[1] "Symposium," p. 43.
[2] SCIENCE, Vol. XX., 1892, p. 297.
[3] "Papers Peabody Mus.," Vol. V., p. 247.
[4] Bull. 66, p. 60.